

SPECIFICATION AMENDMENTS

1. Paragraph 13, line 1: the text changed to the lower case. New version of paragraph 13:

[0013] Other Publications

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2. Paragraph 18, line 1: the double quotation mark has been changed to a single quotation mark. New version of paragraph 18:

[0018] The physiological cues are summarized in Okoshi's book (Okoshi, 1976) and they are: accommodation, convergence, binocular parallax and monocular movement parallax. Accommodation is a cue given by the adjustment of the focal length of the eye's crystalline lens when an eye focuses on a particular object. Convergence is a cue given by the angle made by the two viewing axes of observer's eyes. Binocular parallax is a cue caused by the difference between the views seen by the two eyes of an observer. Monocular movement parallax is a cue observed when a person is moving and is caused by the changing view in each of the person's eyes. Accommodation and monocular parallax are available even when we see an object with a single eye.

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3. Paragraph 21, line 1: the text "OLE_LINK3" has been removed as not being a part of the specification. New version of paragraph 21:

[0021] Another stereoscopic image reproduction method is called parallax barrier technique. This method is based on the idea of showing different images on a display through a blocking

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barrier that has only one vertical slit open at a time. Each open slit has certain image shown through it. This technique, however, reduces display resolution and results in a low light display since the parallax barrier blocks most of the light.

4. Paragraph 24, line 1: the double quotation mark has been changed to a single quotation mark. New version of paragraph 24:

[0024] In 1950's research on Integral Photography by Roger de Montebello lead to new inventions that helped eliminate the pseudoscopic effect by geometrically reorienting elemental images. However some problems still remained. Among these problems are the limit of the image depth that could be provided without blurring, the relatively expensive process of making lens arrays, the problem of lens aberrations, the reflection of light from the lens array that causes the observer to focus his or her eyes on the plane of the display instead of the virtual image behind the screen and thus making it difficult to observe the stereoscopic effect.

5. Paragraph 32: the text "comprises of" in line 2 has been changed to "comprising a" and text "comprising of" in line 3 has been changed to "comprising a". New version of paragraph 32:

[0032] In accordance with the objects of the invention, a stereoscopic display apparatus broadly comprising a backlighting means for projecting light, a spatial light modulator for modulating light emanated by the backlighting means, lens array comprising a plurality of lenses and an optional aperture screen for blocking unwanted light. The aperture screen is used with arrays of converging lenses as a device for selecting only those rays from the backlighting means

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that have a predetermined direction before entering the spatial light modulator. Rays having said predetermined direction are modulated by the spatial light modulator and then refracted by lenses of the lens array. Individual lenses translate spatial modulation of the spatial light modulator into directional modulation by refracting the incoming rays. Also each lens collects all rays with said predetermined direction at focal point. Individual apertures are placed at the focal points of lenses and block any unwanted light.

6. Paragraph 44, line 1: the text "a second embodiment" has been changed to "the second embodiment". New version of paragraph 44:

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[0044] FIG. 5 is a diagrammatic section through the second embodiment of the collimated light source used in the preferred embodiment of the invention.

7. Paragraph 45, line 1: the text "a third embodiment" has been changed to "the third embodiment". New version of paragraph 45:

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[0045] FIG. 6 is a diagrammatic section through the third embodiment of a collimated light source used in the preferred embodiment of the invention.

8. Paragraph 47, line 1: the text "a second embodiment" has been changed to "the second embodiment". New version of paragraph 47:

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[0047] FIG. 8 is a diagrammatic section through the second embodiment of the autostereoscopic display apparatus where the back lighting means is a point light source.

9. Paragraph 48, line 1: the text "a third embodiment" has been changed to "the third embodiment". New version of paragraph 48:

[0048] FIG. 9 is a diagrammatic section through the third embodiment of the autostereoscopic display apparatus where the back lighting means is an array of point light sources.

10. Four new paragraphs have been added following paragraph 48 of the original specification. These paragraphs describe newly added drawings FIG. 10 – FIG. 13. The full text of these new paragraphs:

[0049] FIG. 10 is a diagrammatic section through the fourth embodiment of the autostereoscopic display apparatus where an array of diverging lenses is used.

[0050] FIG. 11 is a diagrammatic section through the fifth embodiment of the current invention where an array of image projectors is used to backlit the lens array.

[0051] FIG. 12 is a diagrammatic section through the sixth embodiment of the autostereoscopic display apparatus where an array of light projectors is used to recreate directional light distribution from a three-dimensional scene.

[0052] FIG. 13 is a diagrammatic section through the seventh embodiment of the current invention where the spatial light modulator is placed in front of the lens array.

11. Paragraph 49, line 2 of the original specification: the text "comprises of" has been changed to "comprising a". New version of paragraph 49, now paragraph 53:

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[0053] Referring to FIG. 1, the preferred embodiment of an autostereoscopic display apparatus comprising a spatial light modulator 1 that is illuminated with collimated light 4, lens array 2 and the aperture screen 3. This apparatus is used to recreate a light field that would be a good approximation to the light field from a three-dimensional scene. The modulating photogram is displayed by means of the spatial light modulator. An opaque box is preferably fitted around the rear and the sides of the autostereoscopic display apparatus to exclude extraneous light.

12. Paragraph 50, line 3 of the original specification: the word "peace" has been changed to "piece". New version of paragraph 50, now paragraph 54:

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[0054] The term "spatial light modulator" as defined herein means a devise whose optical transparency and color at different points can be controlled. The most primitive example of a spatial light modulator is a slide or a picture printed on a piece of plain transparent material. Another example of a spatial light modulator is a liquid crystal display (LCD).

13. Paragraph 51, line 9 of the original specification: the text "comprising of plurality cylindrical lenses" has been replaced with "comprising a plurality of cylindrical lenses". New version of paragraph 51, now paragraph 55:

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[0055] As shown, there is provided a lens-array 2, preferably of a transparent, uncolored plastic material formed as a closely packed network of small uniform elements. Each element should collect the incoming parallel light at a focal point in front of the lens-array. Elements could be conventional lenses, however since elements do not have to deal with the light incident from

any direction other than orthogonal to the plane of the lens-array, they could be Fresnel or diffraction lenses. The packing of lenses is preferably hexagonal or honeycomb pattern, as shown on FIG. 1, but could be any other arrangement, such as square or triangular. The lens array can also be replaced with a lenticular screen comprising a plurality of cylindrical lenses placed next to each other in the horizontal direction.

14. Paragraph 53, line 1 of the original specification: the text "each elemental image 30" has been changed to "each elemental image 20". New version of paragraph 53, now paragraph 57:

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[0057] As shown on FIG. 2, each elemental image 20 of the modulating photogram realized on the spatial light modulator depicts a portion of light field as seen through the window bounded by said elemental image from the point that is situated on the corresponding lens axis one focal distance away from the elemental image. Said focal distance is the focal distance of the corresponding lens of a lens array. The purpose of each elemental image is to reproduce light irradiance and wavelength for all directions within the display's field of view. However, each elemental image by itself does not reproduee the direction of the light. Lenses of the lens array placed next to the spatial light modulator reconstruct the light direction.

15. Paragraph 55, line 6 of the original specification: the text "As shown in FIG. 2" has been changed to "As shown in FIG. 3". New version of paragraph 55, now paragraph 59:

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[0059] By way of additional explanation, reference is had to FIG. 3, which shows the setup used in a preferred embodiment of the invention. FIG. 3 and other figures are not drawn to scale

and are provided purely for illustrative purposes for easier description of the invention. It is a principle of optics that the source of any ray can be found by reversing the direction of the ray and tracing it through the optics back to the source. As shown in FIG. 3 two eyes of an observer 10 and 11 are observing a static virtual object 30 through the plane of the aperture screen 3. Individual apertures are lettered A, B, C, ... I. Each aperture represents a unique point on the screen surface of an autostereoscopic display. Each said point or aperture emits light of different irradiance and color content for different directions. The eye 10 looking in the direction of point E sees the top 32 of the virtual image 30. As can be seen from the FIG. 3 the information about this virtual point,

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16. Paragraph 57, line 2 of the original specification: the text "on the FIG. 2" has been changed to "on the FIG. 3". New version of paragraph 57, now paragraph 61:

[0061] Suppose the observer moves to a different location and looks at the autostereoscopic display with two eyes placed as 12 and 13 on the FIG. 3. The two eyes will observe different points from the aperture B. Specifically the eye 13 will see the top 32 of the virtual object 30, while the eye 12 will observer the bottom 31 of the same virtual object 30

A16

17. Paragraph 58: in line 1 and line 3 of the original specification all references of "FIG. 2" has been changed to "FIG. 3". Also in line 7 the word "lye" has been changed to "lie". New version of paragraph 58, now paragraph 62:

[0062] As it can be seen from the FIG. 3 the eyes 10 and 11 observe different views. Therefore the binocular parallax depth perception cue is reproduced by the given autostereoscopic display.

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Furthermore, as it is seen from FIG. 3 whenever the observer moves around, the static virtual image used in the diagram stays at the same location behind the screen. Thus the monocular movement parallax is exhibited by the presented display. On another hand, when the eyes 10 and 11 are focused on the same virtual point 32 then the viewing axis of the two eyes will lie along the lines connecting corresponding eye with the virtual point 32. Therefore, there is an angle between the two viewing axis of observer's eyes and the convergence depth cue is perceived. Similarly, a virtual point (not shown) that is a little closer than 32 to the observer's eyes 10 and 11 will appear out of focus when the eyes are focused on the point 32. Thus accommodation depth cue is exhibited by the presented autostereoscopic display.

18. Paragraph 59, last line of the original specification: the text "of the autostereoscopic display 6" has been changed to "of the autostereoscopic display". New paragraph 59, now paragraph 63:

[0063] FIG. 2 shows a large-scale view of part of the autostereoscopic display apparatus. It shows one lens 21, an aperture 22 and part of the spatial light modulator 20 that presumably displays one elemental image of a modulating photogram. There are four stages 25, 26, 27 and 28 that the light from the back lighting means travels through. Stage 25 is a stage where in the preferred embodiment of the invention the light 4 is collimated and no information is reconstructed. Light passes through the spatial light modulator and reaches the stage 26 where light color and intensity for the point in the center of the aperture 22 is reconstructed. Then the lens 21 refracts the light giving every ray the proper direction and the light reaches stage 27. At this stage

the spatial modulation is translated into directional modulation for the point in the center of the aperture 22 and distribution of color and intensity for the said point is reconstructed. The aperture 22 in the aperture screen 3 blocks scattered, reflected and other unwanted light and passes only the light that contains information reconstructed about the virtual scene. When the light reaches the stage 28 all distribution of light for the point in the center of the aperture 22 has been reconstructed. An individual aperture 22 can be thought of as a point on a screen of the autostereoscopic display.

19. Paragraph 60 of the original specification: in line 10 the word "doe" has been changed to "due" and in line 26 the word "large" has been changed to "larger". New paragraph 60, now paragraph 64:

A19

[0064] The first important part of the invention is the realization that the spatial light modulator and the lens array should only deal with light rays with predetermined direction at all points on the surface of the spatial light modulator. Preferably the backlighting means should emit a non-diffused light, for instance collimated light. This fact together with close arrangement of the modulating photogram and the lens array eliminates the problem of lens aberration and blurring typical to the conventional Integral Photography. In the conventional Integral Photography the image is placed somewhere close to the plane formed by focal points of the lens-array. The method relies on the approximation that parallel light incident on an arbitrary lens at any angle would focus on the focal plane. In reality the focal plane does not exist due to lens aberrations that are commonly present in lenses with short focal distance. Hence there arises a blurring problem. When

parallel light is used to backlit the modulating photogram the blurring problem is no longer present, since all that is required of any lens is to focus parallel light. Lenses in the present invention do not have to focus light incident from any direction other than the predetermined direction of the back lighting beam. In the preferred embodiment of the invention this direction is orthogonal to the plane of the lens array. This leads to another important part of the present invention: relieved requirements on functionality of lens array. Namely, the only requirement is the ability to focus light that has a predetermined direction. This allows usage of Fresnel lenses or diffraction lenses in the lens-array. These lenses have many advantages compared to conventional lenses. They are usually cheaper to produce and hence may reduce the total cost of the autostereoscopic display production. Fresnel lenses are thinner and therefore cause less chromatiacal aberrations. Another important advantage of Fresnel and diffraction lenses is that it is possible to create lenses with a very short focal distance. The shorter the focal distance is the larger the autostereoscopic display's field of view becomes. Conventional lenses with a very short focal distance have large aberrations and thus can not be used effectively. Fresnel lens array, however, can have a very short focal distance without introducing any substantial aberrations in focusing incident light that has a predetermined direction.

A19 END

20. Paragraph 62, line 11 of the original specification: the double quotation mark has been changed to a single quotation mark. The new paragraph 62, now paragraph 66:

A20

[0066] The method for showing photograms as described in de Montebello's method exhibits strong reflection from the lens-array. This problem makes it difficult for an observer to focus on

the virtual image behind the screen because the reflected light intensity could mask the light that forms the virtual image. An opaque aperture screen introduced in this invention diminishes this problem to the point where it is no longer relevant. Given that apertures are sufficiently small the light that goes through them is only the light that was recorded on the modulating photogram, there is practically no reflection light. This makes it easy for a person in front of the screen to observe a virtual scene. It is preferred that the aperture screen is made out of opaque material such as a thin plastic or metallic panel of a black matte color. Apertures should be made as small as possible. However, apertures' shape and size should ensure that blocking of the light to be focused is negligible. In the preferred embodiment of the invention apertures should not block any light that was emanated by the collimated light source and then refracted by lenses of a lens array. An example depicted on FIG. 7 illustrates calculations of a cylindrical aperture's diameter. As can be seen there is provided a lens 21 that has field of view 70 equal to 45 degrees and the width of the aperture screen panel 3 is 1mm. In order for the aperture not to block any light coming out of the lens the minimum diameter of the aperture 22 should be 1mm.

A20 END

21. Paragraph 70, line 11 of the original specification: the text "2.5kHz" has been changed to "2.5 kHz" by adding a space. The new paragraph 70, now paragraph 74:

A21

[0074] One of the important advantages of the invention over prior art is the fact that the autostereoscopic display apparatus is not time multiplexed. Those skilled in the art are familiar with an approach where back lighting beam changes direction with time and passes through a spatial time modulator. Thus light intensity and color are shown for each different direction at

A21 END

different times. Such approach has been called time multiplexed. However, said method requires spatial light modulator to function at a very high frequency since there can be a very large number of directions for which the light has to be modulated. In addition, in order to avoid flickering, the full modulation cycle through all directions has to happen around 24 times a second. This means that such apparatus reproducing 100 different directions has to have a spatial light modulator that works at a frequency around 2.5 kHz for reproduction of a static stereoscopic picture. Such devices are very expensive to produce if at all possible.

22. In paragraph 71, line 5 of the original specification: a space has been added to "24-80Hz" to make it "24-80 Hz". The new version of paragraph 71, now paragraph 75:

A22

[0075] The present invention introduces a device that is not time multiplexed. No changes in the system are required to show a single static three-dimensional image. To produce motion autostereoscopic picture the spatial light modulator has to modulate light differently at the rate at least 24 times a second. This means that the spatial light modulator has to work at a normal frequency of 24-80 Hz. Such frequency eliminates any flickering. A readily available liquid crystal display can be used in the system.

23. Four paragraphs 76-79 have been added after the original paragraph 71, now paragraph 75. Below is the full text of these four paragraphs:

A23

[0076] Another possible embodiment of the invention is shown on FIG. 10 uses an array of diverging lenses 73, a spatial light modulator 1 and a collimated light source 74. No aperture

screen is used in this case. In this arrangement the three-dimensional image is formed by light rays refracted by each diverging lens of the lens array. Light rays seem to be exiting from the focal points of each diverging lens.

[0077] In yet another embodiment of the invention shown on FIG. 11 functionality of the spatial light modulator and the non-diffuse light source is merged together in a form of an array of projectors 75. Such projectors emit light that has a predetermined direction at every point on the lens array; said light is already modulated and has passed through each projector's own spatial light modulator. The light from each single projector is then refracted by several lenses of the lens array 2. If the projector array 75 is placed relatively close to the lens array 2 then in order to accommodate the non-collimated nature of light incident on the lens array elemental lenses of the lens array have to have specially designed refraction functions to refract light in the same way as an array of converging lenses refracts a beam of collimated light.

A23 cont

[0078] In yet another embodiment of the present invention shown on FIG. 12 functionality of the spatial light modulator, the non-diffuse light source and the lens array is combined together into an array of light projectors 76. When an array of these light projectors is sufficiently large and light projectors are placed close to each other relative to the distance from which they are viewed, then a three-dimensional image exhibiting all four physiological depth perception cues can be formed. Such an array of projectors would be an autostereoscopic display, where each projector acts as pixel on the display that reproduces directional distribution of light of a three-dimensional scene shown on the display.

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END

[0079] Another possible embodiment of the present invention is shown on FIG 13. In this embodiment the spatial light modulator 1 is placed in front of the lens array 2 as viewed from the viewer's position. Light emitted from a collimated source 74 is refracted by individual lenses of the lens array and then is passed through the spatial light modulator. It is important to note that the spatial light modulator can be placed either in front or behind the plane formed by focal points of individual lenses. An optional aperture screen 3 can be added to the apparatus and placed in front of the lens array at a distance equal to the focal distance of individual lenses of the lens array. In such an arrangement focal points of individual lenses coincide with apertures of the aperture screen.

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24. Abstract of the disclosure has been changed to comply with the 150 word limit set forth in the 37 CFR §1.72(b). Also in line 1, "apparatus broadly comprises of" has been changed to "apparatus broadly comprises a". Also in line 3 "lens array comprising of" has been changed to "lens array comprising a". The full text of the abstract of the disclosure:

A24

An autostereoscopic display apparatus broadly comprises a backlighting means for projecting light, a spatial light modulator for modulating light emanated by the backlighting means, lens array comprising a plurality of lenses and an optional aperture screen for blocking unwanted light and for minimizing reflections from the external lighting. Said apparatus is used to reproduce directional distribution of light from a computer generated or a photographically captured three-dimensional scene. It is preferred that a collimated light source is used as the backlighting means. The aperture screen is used to improve the quality of the autostereoscopic image when the

backlighting means exhibit some diffuse properties. For instance, the aperture screen can be used as a device to select only those rays from the backlighting means that are orthogonal to the plane of the spatial light modulator.

A24 END

25. A clean version of the entire set of pending claims is being submitted in accordance with 37 CFR §1.121(c)(3). Thus we request to cancel all previous pending claims 1-25 and replace them with a new set of claims 1-24. The new set of 25 claims contains 1 independent claim and 12 multiple dependent claims. The dependency structure of the claims has been improved and individual claims have been rewritten to more clearly describe the structure that goes to make up the device. The new set of claims is listed below.

Rule 1.126

26 ~~[01]~~ An autostereoscopic image displaying method capable of reproducing all four physiological depth perception cues as defined in the specification by means of using an autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising:

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an array of light projecting devices wherein each light projecting device emanates light with a predetermined directional distribution in intensity and color and the whole array reproduces light distribution from a three-dimensional scene, said light projecting devices facing the viewer and are placed sufficiently close to each other so that the viewer would not notice granularity when viewing the image from a distance larger than a certain minimum distance.

27 ~~[22]~~ An autostereoscopic display method and apparatus according to claim ~~1~~ 26, wherein said array of light projecting devices comprising:

a lens array comprising a plurality of elemental lenses, wherein the light that originates from focal points of individual lenses forms an autostereoscopic image;

an image projector or a collection of such for projecting light in a form of a non-diffuse light, said projector(s) placed behind the lens array as viewed from the viewer's position and projecting light onto the lens array and wherein said projector(s) is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array, said projector(s) displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus.

A25 CONT

28 ~~[23]~~ An autostereoscopic display method and apparatus according to claim ~~1~~ 26, wherein said array of light projecting devices comprising:

an aperture screen made of opaque material with plurality of apertures, wherein said apertures are transparent and do not significantly diffuse light, in said aperture screen light that originates in individual apertures and that is emitted from apertures at a range of directions forms an autostereoscopic image;

a lens array composed of plurality of elemental converging lenses placed behind the aperture screen as viewed from the viewer's position, wherein points where the light is focused by individual lenses coincide with apertures of the aperture screen;

an image projector or a collection of such for projecting light preferably but not necessarily in a form of a non-diffuse light, said projector(s) placed behind the lens array as viewed from the viewer's position and projecting light onto the lens array, wherein said projector(s) in the case of non-diffuse light is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array, said projector(s) displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus.

D.2.5 Cont. 29 [~~64~~] An autostereoscopic display method and apparatus according to claim 27 ~~2~~, wherein said image projector or a collection of such comprising:

a spatial light modulator placed behind the lens array as viewed from the viewer's position, said spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;

a backlight in a form of a non-diffuse light source placed behind the spatial light modulator as viewed from the viewer's position, said backlight projecting light onto the spatial light modulator, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the spatial light modulator.

30 [~~58~~] An autostereoscopic display method and apparatus according to claim 28 ~~7~~, wherein said image projector or a collection of such comprising:

a spatial light modulator placed behind the lens array as viewed from the viewer's position, said spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;

a backlight preferably but not necessarily in a form of a non-diffuse light source placed behind the spatial light modulator as viewed from the viewer's position, said backlight projecting light onto the spatial light modulator, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the spatial light modulator.

A25 cont.

31 ~~[26]~~ An autostereoscopic display method and apparatus according to claim ~~1~~ 26, wherein said array of light projecting devices comprising:

a spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;

a lens array composed of plurality of elemental lenses, wherein the light that originates from focal points of individual lenses and passes through the spatial light modulator forms an autostereoscopic image, said lens array is placed, as viewed from the viewer's position, behind the spatial light modulator at a distance that may be smaller or greater than the focal distance of lenses in the lens array;

a backlight in a form of a non-diffuse light source placed behind the lens array as viewed from the viewer's position, said backlight projecting light onto the lens array, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array.

32 ~~[97]~~ An autostereoscopic display method and apparatus according to claim 26 ~~X~~, wherein said array of light projecting devices comprising:

an aperture screen made of opaque material with plurality of apertures, wherein said apertures are transparent and do not significantly diffuse light;

a lens array composed of plurality of elemental converging lenses placed behind the aperture screen as viewed from the viewer's position, wherein points where the light is focused by individual lenses coincide with apertures of the aperture screen;

a spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus, said spatial light modulator is placed in front of the lens array and either in front or behind the aperture screen as viewed from the viewer's position;

a backlight preferably but not necessarily in a form of a non-diffused light source placed behind the lens array as viewed from the viewer's position, said backlight projecting light onto the lens array, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array.

33 [~~c8~~] An autostereoscopic display apparatus according to any one of the claims 27 ~~2~~, 29 ~~4~~ and 31 ~~6~~,

wherein:

said lens array comprising a plurality of elemental lenses wherein at least one element of the lens array is behaving as a converging lens.

34 [~~c9~~] An autostereoscopic display apparatus according to any one of the claims 27 ~~2~~, 29 ~~4~~ and 31 ~~6~~,

wherein:

said lens array comprising a plurality of elemental lenses wherein at least one element of the lens array is behaving as a diverging lens.

35 [~~c10~~] An autostereoscopic display apparatus according to any one of the claims 27 ~~2~~ to 32 ~~7~~,

wherein:

said lens array comprising a plurality of lenses at least one of which is a Fresnel lens.

36 [~~c11~~] An autostereoscopic display apparatus according to any one of the claims 27 ~~2~~ to 32 ~~7~~,

wherein:

said lens array comprising a plurality of lenses at least one of which is a diffraction lens.

37 [~~c12~~] An autostereoscopic display apparatus according to any one of the claims 29 ~~4~~ to 32 ~~7~~

wherein:

said backlight is a collimated light source.

38 [~~c13~~] An autostereoscopic display apparatus according to any one of the claims ~~4~~ 29 to ~~7~~ 32, wherein:

said backlight is a point light source.

39 [~~c14~~] An autostereoscopic display apparatus according to any one of the claims ~~4~~ 29 to ~~7~~ 32, wherein:

said backlight is an array of point light sources, said point light sources are separated by opaque partitions arranged in such a way so that light from any two point light sources does not illuminate the same area on a backlit surface which is either the spatial light modulator or the lens array.

40 [~~c15~~] An autostereoscopic display apparatus according to any one of the claims ~~4~~ 29 to ~~7~~ 32

wherein:

said spatial light modulator is a liquid crystal display.

41 [~~c16~~] An autostereoscopic display apparatus according to the claim 1 wherein:

said array of light projecting devices is an array of liquid crystal display projectors.

42 [~~c17~~] An autostereoscopic display apparatus according to any one of the claims ~~2~~ 27 to ~~7~~ 28 wherein:

said image projector is a liquid crystal display projector.

43 [~~c18~~] An autostereoscopic display apparatus according to claim ~~1~~ 26, wherein:

said array of light projecting devices uses color multiplexing to display an autostereoscopic image, which can be achieved either by devoting different light projecting devices to different basic colors or by making the same light projecting device radiate light of different basic colors over time switching between different colors with a high frequency, or by combination of these two techniques, said light projecting devices working in single color mode reproduce light distribution in intensity of single color from a three-dimensional scene displayed by the whole apparatus.

A25 cont

44 [~~c19~~] An autostereoscopic image capture and reproduction system similar to television capable of reproducing all four physiological depth perception cues as defined in the specification, said system comprising:

a three-dimensional image capture apparatus for capturing information about a three-dimensional scene including directional distribution of light color and intensity at all points in some window in space for all directions within a certain field of view, wherein such apparatus could be any of the three-dimensional image capturing apparatuses described in the prior art;

an autostereoscopic display apparatus according to any one of the claims ~~1~~ 26 to ~~7~~ 32;

a transmission system for transmitting said information from said three-dimensional image capture apparatus to said autostereoscopic display.

45 [~~c20~~] An autostereoscopic image capture and reproduction system according to claim ~~19~~ 44, wherein:

said information is stored in some form during a transmission process for the purpose of recreating the three-dimensional scene at some later point in time by said autostereoscopic display apparatus.

a25 cont

46 [~~c21~~] An autostereoscopic image capture and reproduction system according to claim ~~19~~ 44, wherein:

said information is transmitted by means of electromagnetic waves propagating in cables, waveguides or as airwaves.

47 [~~c22~~] An autostereoscopic display apparatus according to any one of the claims ~~1~~ 26 to ~~7~~ 32 wherein:

the outer surface of the display is not flat and may enclose some volume in space.

48 [~~c23~~] An autostereoscopic display apparatus that is composed of several autostereoscopic displays according to any one of the claims ~~1~~ 26 to ~~7~~ 32.

48

49 [c~~24~~] An autostereoscopic display apparatus according to claim ~~23~~ wherein:

said autostereoscopic display forms a surface that is not flat and may enclose some volume in space.